REMARKS

The amendment to Claim 9 above serves only to narrow the scope of the presently claimed process by substituting the closed phrase "consisting of" for the open phrase "comprising". Applicants respectfully submit that no new matter has been added by this amendment.

Claims 3-9 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Volkert reference (U.S. Patent 5,096,933).

The Volkert reference is directed to a process for the preparation of rigid polyurethane foams having a low thermal conductivity. This process comprises reacting a) organic and/or modified organic polyisocyanates, with b) at least one higher molecular weight compound having at least two reactive hydrogen atoms, and optionally, c) lower molecular weight chain extending agents and/or crosslinking agents in the presence of d) cyclopentane, or mixtures comprising cyclopentane and/or cyclohexane, or at least one compound homogenously miscible with cyclopentane and/or cyclohexane, which preferably has a boiling point below 35°C, and optionally, in combination with water, as well as in the presence of e) catalysts, and f) auxiliary agents and additives.

Applicants respectfully submit that the presently claimed invention is not rendered obvious by the Volkert reference (U.S. Patent 5,096,933).

One of ordinary skill in the art would not expect to be able to prepare dimensionally stable, flame-resistant polyurethane rigid foams that exhibit no surface brittleness upon reading the Volkert reference. The disclosure of this reference is broad in terms of the suitable blowing agents that are described. Suitable blowing agents include those compounds disclosed at column 8, line 42 through column 9, line 40.

The Volkert reference discloses that suitable blowing agents include cyclopentane; mixtures of (1) cyclopentane, cyclohexane or a mixture thereof and (2) at least one low boiling point compound homogeneously misicible with cyclopentane and/or cyclohexane, that preferably has a boiling point below 35°C.

See column 8, lines 42-50. It is further disclosed by the Volkert reference that these blowing agents can be used alone or preferably in conjunction with water (see column 8, line 67 through column 9, line 1).

It is readily apparent to one of ordinary skill in the art that the preferred blowing agents are a combination of cyclopentane and water; cyclopentane and/or cyclohexane, and water; cyclopentane and/or cyclohexane, water, and one or more low boiling alkanes. See column 9, lines 2-8. The Volkert reference further describes specific blends in terms of parts by weight at column 9, lines 21-40 as determined by the boiling point of the mixture and desired low thermal conductivity of the rigid PU foams to be formed. By comparison, the presently claimed process clearly excludes the presence of other blowing agents include water and any other low boiling compounds. The presently claimed invention is limited to one or more C_1 to C_6 hydrocarbons as the blowing agent.

Applicants respectfully submit that although the Volkert reference broadly discloses that the blowing agent may be only cyclopentane, cyclohexane or a mixture thereof, the working examples of this reference **always** use at least water (3.6 pbw) and cyclopentane (10.9 pbw) as in Example 1. Examples 2-5 all require a low boiling component. Of these four (4) examples, Example 4 is the only one that uses a "low boiling component" which would fall within the scope of a C_1 to C_6 hydrocarbon as required by Applicants claims. However, this example also requires 3.0 pbw of water. As discussed above, water is clearly excluded from the presently claimed process. Furthermore, water is known to result in surface brittleness of foams due to the reaction between the isocyanate and the water in which carbon dioxide is eliminated. Thus, the foams of Examples 1 and 4 in the Volkert reference would clearly exhibit surface brittleness.

In the remaining Examples (i.e. Examples 2, 3 and 5), a low boiling compound is used as well as water and cyclopentane. In these Examples, the amount of water varies from 1.8 pbw (Example 5) to 3.5 pbw (Example 3), and the quantity of other blowing agent component or mixture of components varies from 12 pbw (Example 3) to 16 pbw (Example 5). Examples 2 and 5 use partially fluorinated hydrocarbons, and Example 3 uses an ether (i.e. diethylether). The foam produced

in Example 3 would also be expected to exhibit surface brittleness due to elimination of carbon dioxide from the isocyanate-water reaction. The remaining foams (i.e. those of Examples 2 and 5) were prepared with a partially fluorinated hydrocarbon. Thus, these examples are irrelevant to the presently claimed invention.

Applicants respectfully submit that one of ordinary skill in the art has no insight into the presently claimed invention upon reading the Volkert reference. The skilled artisan could not possibly expect to produce rigid PU foams which are dimensionally stable, flame resistant, and exhibit no surface brittleness by selecting a branched polyether polyol for the high molecular weight component and one or more C_1 to C_6 hydrocarbons as the sole blowing agent.

As Examples 1 and 2 (both comparison examples) in Table 1 (on page 11) of the present application illustrates, it is possible to produce rigid foams that exhibit no surface brittleness when using only a hydrocarbon such as, for example, cyclopentane, as the blowing agent, in combination with an isocyanate-reactive component that is free of branched chains. However, these foams are not dimensionally stable. In Table 2 (page 12) of the present application, Examples 1-4 are representative of the presently claimed invention and Example 5 is a comparative example. Example 5 is comparative as the isocyanate index used to produce the foam is clearly outside the presently claimed range of 200 to 600.

All of the foams produced in Examples 1-5 have good adhesion of the covering layer after 24 hrs., are flame resistant, and exhibit no surface brittleness. Examples 1-3 exhibit no shrinkage, Example 4 exhibits almost no shrinkage but is dimensionally stable. Example 5 clearly exhibits shrinkage and is not dimensionally stable. Since Example 5 satisfies all other critical aspects of the presently claimed invention (namely it uses an isocyanate-reactive component that contains branched chains, and it uses one or more C_1 to C_6 hydrocarbons as the sole blowing agent) except for the presently required isocyanate index, it is apparent that the isocyanate index used to prepare the rigid foam is also critical.

The Volkert reference does not provide sufficient guidance to one of ordinary skill in the art such that one could reasonably expect to produce a rigid foam that is flame resistant and dimensionally stable while being free of surface brittleness from

the presently required combination of components at the presently required isocyanate index. One of ordinary skill in the art would simply not expect that the presently required combination of an isocyanate-reactive component containing branched chains, one or more C_1 to C_6 hydrocarbons as the sole blowing agent and an isocyanate index of 200 to 600 would result in flame resistant, dimensionally stable rigid foams that are free of surface brittleness.

Attached hereto is a marked-up version of the changes made to the specification and claims by the present amendment. The attached page is captioned **"Version with markings to show changes made."**

In view of the above amendments and remarks, Applicants respectfully request the allowance of Claims 3-9.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE:

IN THE CLAIMS:

Please amend Claim 9 as follows.

9. (Twice Amended) A process for the production of rigid foams containing urethane groups and predominately isocyanurate groups [comprising] consisting of reacting:

1) polyisocyanates;

with

2) from 30 to 90 parts by weight of compounds containing at least two isocyanate-reactive hydrogen atoms, having molecular weights of 400 to 10,000, and containing branched chains;

in the presence of

3) one or more C_1 to C_6 hydrocarbons as the sole blowing agents;

4) from 10 to 60 parts by weight of flameproofing agents;

and

5) from 10 to 20 parts by weight of compounds containing at least two isocyanate-reactive hydrogen atoms and having molecular weights of 32 to 399 as crosslinking agents;

and, optionally,

6) other known auxiliary agents and additives;

wherein the parts by weight of components (2), (4) and (5) totals 100 parts by weight, and wherein the reaction is conducted at an isocyanate index of 200 to 600.